Los Alamos using NIH grant to study how social behaviors affect spread of disease

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LOS ALAMOS, New Mexico, August 15, 2011—Connecting social media and epidemiological research, a new study by Los Alamos National Laboratory and Tulane University will attempt to predict the future, i.e. people's social behavior during an epidemic, using Twitter, the social media messaging site. If successful, the results will improve the computer models used to plan and respond to disease outbreaks. Understanding human behavior can help save people's lives and the government millions of dollars in vaccine costs and epidemic response planning.

Their tool of choice? The Library of Congress' archive of all previous Twitter postings, called "tweets." The researchers are going back in time to see how Twitter messages correlated with people's behavior during the H1N1 influenza outbreak. The Twitter-mined knowledge about human behavior will be incorporated into large-scale agent-based epidemic models.

"To predict the future, we have to understand the past," said Los Alamos National Laboratory scientist Sara Del Valle, who, along with Tim McPherson of LANL's Energy and Infrastructure Analysis group, Susan Mniszewski of Information Sciences, and Mac Hyman from Tulane University, have been awarded a five-year grant by the National Institutes of Health for Modeling Infectious Disease Agents (MIDAS)

"For instance, many people were skeptical about the H1N1 vaccine due to the accelerated approval process. Through social media, we can quantify the degree to which some people were afraid and others were in favor. We can search terms such as 'vaccine,' or 'mask' or other key words and capture, pro or con, what the public sentiment was at the time. And we can use that in our predictive computer modeling," said Del Valle.

"Agent-based models simulate the spread of infectious diseases based on hypothetical interactions among millions of people," said James Anderson, Ph.D., who helps manage the MIDAS program at the National Institutes of Health. "Dr. Del Valle's study will seek to determine how uncertainty in the assumptions we make, such as how people's behavior might change as an epidemic progresses, can affect how the models are applied in real situations. We expect the findings will have broad implications for how these models are used."

In addition to the social media work, Del Valle and her team will develop algorithms for quantifying the uncertainty in agent-based model predictions. Quantifying parameter and computational uncertainties is crucial for forecasting the impact of disease spread.

"We cannot assume that the impact of the uncertain parameters is negligible; especially when decisions based on the model will affect the lives of countless people," said Del Valle.

"If there's a new pandemic, and we start tracking what people are tweeting, we can make better predictions of how likely they are to get vaccinated, wash hands, or wear a mask. If you see more negative messages, you can start to change your communications strategy. Our goal is to help government make policy decisions that are more in tune with public inclinations and concerns. We could even help reduce economic impacts, avoiding waste from inefficient predictions," said Del Valle.

This type of research is geared toward improving all existing epidemiological models, furthering the ability of public health practitioners and policymakers to effectively manage a burgeoning epidemic regardless of the model they use.

This grant also will support efforts to understand how population behavior affects the accuracy and applicability of models that predict the spread of disease.

Related links:

http://blog.twitter.com/2010/04/tweet-preservation.html
http://www.nigms.nih.gov/Research/SpecificAreas/MIDAS/Pages/default.aspx;
http://www.nigms.nih.gov/News/Pages/default.aspx